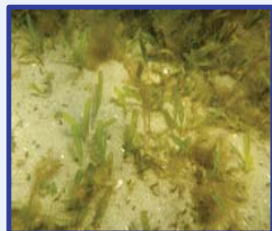


Evaluating Salinity Targets for Protecting Seagrass in the St. Lucie Estuary and Adjacent Indian River Lagoon

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ABSTRACT

The St. Lucie Estuary (SLE) “salinity envelope” was established under the Indian River Lagoon Surface Water Improvement and Management Program to protect oysters and seagrass. The envelope is achieved when salinity is between 12 and 20 psu at the US1 Bridge, which results in salinities typically being greater than 20 psu in downstream seagrass beds. Salinity and seagrass data (2008 – 2013) were used to evaluate the appropriateness of the envelope for protecting seagrass. Seagrass percent occurrence typically declined when salinity fell below the envelope with recovery occurring when salinities were within or above the envelope. In 2010/2011, salinity exceeded the envelope’s upper limit for over 8 months and then rapidly declined. Even though salinity remained within seagrass tolerance ranges during this decline, seagrass percent occurrence decreased. Maintaining salinity within the envelope would prevent steep salinity declines and result in favorable salinities suggesting the envelope is appropriate for protecting seagrass.



STUDY AREA



Figure 1. Automatic salinity recorders are located on the A1A and US1 bridges, seagrass is monitored near the mouth of the St. Lucie Estuary (WILL_CR). Salinity targets set/measured at US1.

SALINITY

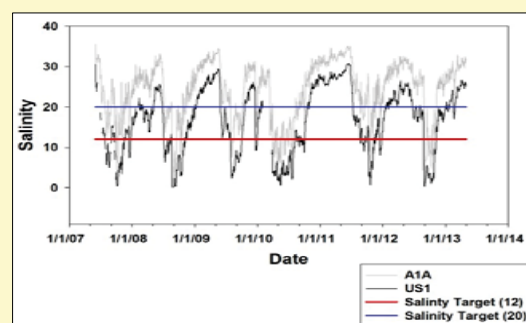


Figure 2. Daily average salinity.

- Salinity patterns similar at both bridges with A1A values higher
- Targets (“salinity envelope”: 12 – 20 psu at US1) rarely met during study period
- Consecutive days within the salinity envelope rarely exceeded 30 days (seagrass monitoring typically conducted monthly)

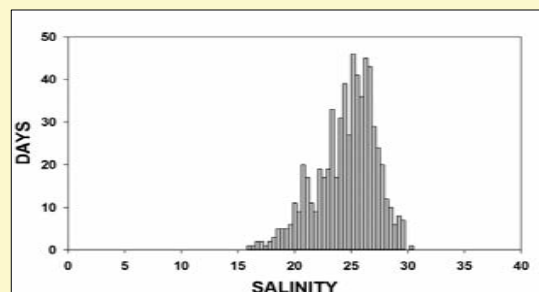


Figure 3. Frequency distribution of daily average salinity at A1A when salinity envelope met at US1.

When salinity envelope was met:

- Salinity at A1A was above 20 psu, 96 percent of the time
- Salinity never fell below 16 psu

SEAGRASS



Figure 4. Seagrass percent occurrence over time.

- The most upstream, persistent seagrass bed in the St. Lucie Estuary is located near Willoughby Creek; the South Florida Water Management District monitors seagrass at this location (WILL_CR; Figure 1)
- Two seagrass species present at the WILL_CR site:
 - *Halophila johnsonii* (Johnson's seagrass)
 - *Halodule wrightii* (Shoal grass)

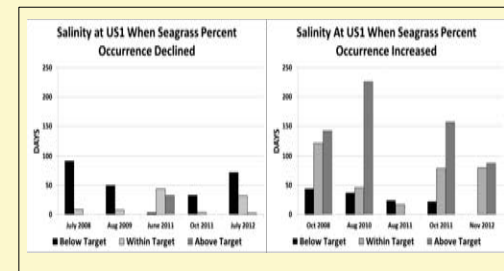


Figure 5. Salinity at US1 associated with changes in percent occurrence at WILL_CR (Below target = salinity < 12; Within target = salinity ≥ 12 and ≤ 20; Above target = salinity > 20.)

- Seagrass percent occurrence increases were typically associated with salinity above 12 psu at US1
- Seagrass percent occurrence declines were most often associated with US1 salinities below 12 psu
- **Exception:** percent occurrence declined during the growing season in 2011 following a prolonged (8.5 month) period where salinity was above the 20 psu target then fell sharply but stayed above 12 psu target. Salinity fell from 35 to 18 psu at A1A and seagrass percent occurrence declined

CONCLUSIONS

- The lower salinity target of 12 psu at US1 appears to be appropriate for maintaining seagrass beds near the mouth of the SLE and in the adjacent Southern Indian River Lagoon
- Achieving the upper target of 20 psu at US1 would result in less salinity variability than currently occurs and is expected to provide appropriate conditions for seagrass growth
- The percent occurrence patterns observed suggest that even when salinity is within generally accepted seagrass salinity ranges (Irlandi 2006), rapid/steep drops in salinity may lead to declines in seagrass percent occurrence (mesocosm studies would help evaluate this hypothesis)
- Seagrass recovery took from 8 to 17 months for Johnson's seagrass and 8 to 10 months for shoal grass

BOTTOM LINE

Maintaining salinity within the salinity envelope would prevent steep salinity declines and result in favorable salinities for protection of seagrasses.



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